CLAIMS

What is claimed is:

1. A microelectronic device assembly, comprising:
a substrate having a plurality of contacts;
a microelectronic component carried by the substrate, the microelectronic component carrying a plurality of multi-layered bond pads, each of the multi-layered bond pads comprising a bond pad base, an outer bond layer, and a conductive intermediate layer between the bond pad base and the outer bond layer, the bond pad base comprising a metal selected from the group consisting of aluminum and copper and the outer bond layer comprising a first metal; and
a plurality of bonding wires comprising the first metal, a first end of each bonding wire being bonded to one of the contacts and a second end of each bonding wire being bonded to the outer bond layer of one of the multi-layered bond pads.

2. The microelectronic device assembly of claim 1 wherein the first metal comprises gold.

3. The microelectronic device assembly of claim 2 wherein each of the bonding wires comprises a gold alloy.

4. The microelectronic device assembly of claim 1 wherein the intermediate layer comprises titanium, tungsten, chromium, or an alloy of titanium, tungsten, or chromium

5. The microelectronic device assembly of claim 1 wherein an outer surface of the outer bond layer is spaced no more than 1 μm from the bond pad base.

6. The microelectronic device assembly of claim 1 wherein the second end of each bonding wire is stitch bonded to the outer bond layer of one of the multi-layered bond pads.

7. The microelectronic device assembly of claim 1 wherein the first end of each bonding wire is ball bonded to one of the contacts and the second end of each bonding wire is stitch bonded to the outer bond layer of one of the multi-layered bond pads.

8. The microelectronic device assembly of claim 1 wherein the bond pad base has an effective surface area, the outer bond layer having an outer surface having a surface area which is no less than the effective surface area of the bond pad base.

9. The microelectronic device assembly of claim 1 wherein the outer bond layer extends laterally beyond a periphery of the effective area of the bond pad base.

10. The microelectronic device assembly of claim 1 further comprising a passivation layer carried by the active surface of the die, the passivation layer having a plurality of passivation openings therein, each of the passivation openings being aligned with of one of the bond pad bases.

11. The microelectronic device assembly of claim 10 wherein each multi-layered bond pad substantially fills the passivation opening with which it is aligned.

12. The microelectronic device assembly of claim 10 wherein the outer bond layer of each multi-layered bond pad extends outwardly beyond an outer surface of the passivation layer.

13. The microelectronic device assembly of claim 10 wherein the outer bond layer of each multi-layered bond pad extends laterally beyond a periphery of the passivation opening with which the bond pad is aligned.

14. The microelectronic device assembly of claim 1 wherein the bonding wire has a maximum height of no greater than 3 mils with respect to an active surface of the microelectronic component.

15. A microelectronic device assembly, comprising:

a substrate having a plurality of contacts;

a microelectronic component carried by the substrate, the microelectronic component carrying a plurality of multi-layered bond pads, each of the multi-layered bond pads comprising a bond pad base comprising aluminum, an outer bond layer comprising gold, and a intermediate layer between the bond pad base and the outer bond layer, the intermediate layer comprising a metal selected from the group consisting of titanium, tungsten, and chromium; and

a plurality of bonding wires comprising gold, a first end of each bonding wire being bonded to one of the contacts and a second end of each bonding wire being bonded to the outer bond layer of one of the multi-layered bond pads.

16. The microelectronic device assembly of claim 1 wherein an outer surface of the outer bond layer is spaced no more than 1 mil from the bond pad base.

17. The microelectronic device assembly of claim 15 wherein the second end of each bonding wire is stitch bonded to the outer bond layer of one of the multi-layered bond pads.

18. The microelectronic device assembly of claim 15 wherein the first end of each bonding wire is ball bonded to one of the contacts and the second end of each bonding wire is stitch bonded to the outer bond layer of one of the multi-layered bond pads.

19. The microelectronic device assembly of claim 15 wherein the bond pad base has an effective surface area, the outer bond layer having an outer surface having a surface area which is no less than the effective surface area of the bond pad base.

20. The microelectronic device assembly of claim 15 wherein the outer bond layer extends laterally beyond a periphery of the effective area of the bond pad base.

21. The microelectronic device assembly of claim 15 further comprising a passivation layer carried by the active surface of the die, the passivation layer having a

plurality of passivation openings therein, each of the passivation openings being aligned with of one of the bond pad bases.

22. The microelectronic device assembly of claim 21 wherein each multi-layered bond pad substantially fills the passivation opening with which it is aligned.

23. The microelectronic device assembly of claim 21 wherein the outer bond layer of each multi-layered bond pad extends outwardly beyond an outer surface of the passivation layer.

24. The microelectronic device assembly of claim 21 wherein the outer bond layer of each multi-layered bond pad extends laterally beyond a periphery of the passivation opening with which the bond pad is aligned.

25. The microelectronic device assembly of claim 15 wherein the bonding wire has a maximum height of no greater than 3 mils with respect to an active surface of the microelectronic component.

26. A microelectronic device assembly, comprising:

a microelectronic component having a multi-layered bond pad, the multi-layered bond pad comprising a bond pad base, an outer bond layer, and a conductive intermediate layer between the bond pad base and the outer bond layer, the bond pad base comprising aluminum and the outer bond layer comprising a first metal; and

a bonding wire having a first end stitch bonded to the outer bond layer of the multi-layered bond pad, the bonding wire being formed of a conductive metal comprising the first metal.

27. The microelectronic device assembly of claim 26 wherein the first metal comprises gold.

28. The microelectronic device assembly of claim 27 wherein the conductive metal comprises a gold alloy.

29. The microelectronic device assembly of claim 26 wherein the bonding wire has a second end ball bonded to a contact of a substrate.

30. The microelectronic device assembly of claim 26 wherein the microelectronic component has a plurality of multi-layered bond pads.

31. The microelectronic device assembly of claim 30 wherein a separate bonding wire is stitch bonded to each of the multi-layered bond pads.

32. The microelectronic device assembly of claim 26 wherein the bond pad base has an effective surface area, the outer bond layer having an outer surface having a surface area which is no less than the effective surface area of the bond pad base.

33. The microelectronic device assembly of claim 26 wherein the outer bond layer extends laterally beyond a periphery of the effective area of the bond pad base.

34. The microelectronic device assembly of claim 26 further comprising a passivation layer carried by the active surface of the die, the passivation layer having a plurality of passivation openings therein, each of the passivation openings being aligned with of one of the bond pad bases.

35. The microelectronic device assembly of claim 34 wherein each multi-layered bond pad substantially fills the passivation opening with which it is aligned.

36. The microelectronic device assembly of claim 34 wherein the outer bond layer of each multi-layered bond pad extends outwardly beyond an outer surface of the passivation layer.

37. The microelectronic device assembly of claim 34 wherein the outer bond layer of each multi-layered bond pad extends laterally beyond a periphery of the passivation opening with which the bond pad is aligned.

38. A microelectronic device assembly, comprising:

a microelectronic component having electronic circuitry and a bond pad base electrically coupled to the electronic circuitry, the circuitry and the bond pad base comprising a first metal, the bond pad base having an effective surface;

a conductive intermediate layer covering the effective surface of the bond pad base, the intermediate layer comprising a second metal which is different from the first metal;

an outer bond layer applied on the intermediate layer, the outer bond layer having an external surface which is no smaller than the effective surface of the bond pad base, the outer bond layer comprising a third metal which is different from the first metal and from the second metal; and

a bonding wire which has a first end bonded to the outer bond layer and extending laterally away from the microelectronic component to couple the microelectronic component to a terminal of another electronic device, the bonding wire being formed of a metal which comprises the third metal

39. The microelectronic device assembly of claim 38 wherein the first metal is selected from the group consisting of aluminum and copper.

40. The microelectronic device assembly of claim 38 wherein the second metal limits diffusion of the third metal into the first metal.

41. The microelectronic device assembly of claim 40 wherein the second metal is selected from the group consisting of titanium, tungsten, and chromium.

42. The microelectronic device assembly of claim 41 wherein the intermediate layer comprises an alloy of the second metal.

43. The microelectronic device assembly of claim 38 wherein the bond pad base is carried adjacent an active surface of the microelectronic component, the bonding wire having a maximum height of no greater than 3 mils with respect to the active surface of the microelectronic component.

44. The microelectronic device assembly of claim 38 wherein the outer bond layer extends laterally beyond a periphery of the effective area of the bond pad base.

45. The microelectronic device assembly of claim 38 wherein the microelectronic component further comprises a passivation layer which surrounds the effective surface of the bond pad base.

46. The microelectronic device assembly of claim 38 wherein the microelectronic component further comprises a passivation layer which surrounds the effective surface of the bond pad base, the outer bond layer extending laterally outwardly over the passivation layer.

47. The microelectronic device assembly of claim 46 wherein the intermediate layer extends between the passivation layer and the outer bond layer.

48. A process of electrically coupling a microelectronic component to a substrate, comprising:

forming a plurality of multi-layer bond pads by:

depositing an intermediate bond layer of a first metal on an outer surface of each of a plurality of integrated bond pads carried by an active surface of the microelectronic component, the integrated bond pads being formed of a metal different from the first metal; and

thereafter, depositing an outer bond layer on the intermediate bond layer deposited on each integrated bond pad, the outer bond layer comprising a second metal which is different from the first metal;

thereafter, positioning the microelectronic component with respect to the substrate with the active surface of the microelectronic component spaced from a contact surface of the substrate;

ball bonding a first end of a first bonding wire to a first contact carried by the contact surface of the substrate, the first bonding wire comprising the first metal; and

stitch bonding a second end of the first bonding wire to the outer bond layer of a first one of the multi-layer bond pads.

49. The method of claim 48 wherein the first metal comprises gold.

50. The method of claim 48 wherein the outer bond layer is electrodeposited.

51. The method of claim 48 further comprising ball bonding a first end of a second bonding wire to a second contact carried by the contact surface and stitch bonding a second end of the second bonding wire to the outer bond layer of a second one of the multi-layer bond pads.